Proposals

This section offers readers an opportunity to exchange interesting and elegant mathematical problems. Proposals are always welcomed. Please observe the following guidelines when submitting proposals or solutions:

1. Proposals and solutions must be legible and should appear on separate sheets, each indicating the name and address of the sender. Drawings must be suitable for reproduction. Proposals should be accompanied by solutions. An asterisk (*) indicates that neither the proposer nor the editor has supplied a solution.

2. Send submittals to: **José Luis Díaz-Barrero**, Applied Mathematics III, Universitat Politècnica de Catalunya, Jordi Girona 1-3, C2, Room 211-A, 08034 Barcelona, Spain or by e-mail to: *jose.luis.diaz@upc.edu.*

Proposals for Olympiads

1. *Find the following sum:*

$$\cos 1^\circ + \cos 2^\circ + \ldots + \cos 178^\circ + \cos 179^\circ$$

2. *Prove that* $2^{2008} - 1$ *is multiple of* 15.

3. *Prove that, given* n *squares, one can always cut them (using only compasses, straight edge and scissors) and reform them into a large square.*

4. *Let* a, b *be nonnegative real numbers such that* $ab \geq a^3 + b^3$. *Prove that* $a + b \leq 1$.

5. *Let* ABC *be an isosceles triangle with* $|AB| = |AC|$. *The height corresponding to the vertex* B *meets the side* AC *in* M. *Prove that*

$$1 + \frac{|AM|}{|MC|} = 2\left(\frac{|AB|}{|BC|}\right)^2$$

6. *Let* $p_1, p_2, \ldots, p_n$ *be* n *people with different ages. Place them in order, so that each one is either older than all the preceding or is younger than all the preceding. In how many ways can this be done?*